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INFORMATION REPORT

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COUNTRY International

SUBJECT Comments on Diseases which Affect Certain
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[Available on loan from the CIA Library is a study of diseases affecting
certain of the world's economically important crops, prepared by a
privately-financed US research institute.]

Introduction

1. The treatise on diseases which affect certain of the world's economically important crops would be of slight value to a professional pathologist who would recognize its many inaccuracies and lack of completeness. The table of contents is badly organized. Annual, perennial and miscellaneous categories have no essential meaning in the objectives of this work. Use is the proper basis for classification here. Grapes, sugar cane and sorghum would more naturally appear under food and beverage plants. Sugar cane (*saccharum*) is not an annual as indicated in the table of contents, but a perennial.
2. In paragraph two of the introduction, it is stated under (4), that epidemics may be due to efforts of plant breeders. This is an indirect cause. It should be explained that it refers to the production, through breeding of homozygous lines, of homozygous lines which are more likely to be completely destroyed during an epidemic than open fertilized or heterozygous plant populations.

In paragraph five, the statement that "most virus diseases do not warrant attention" could not find support by plant pathologists generally. While

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the authors do include one virus disease (swollen shoot of cacao) which actually spreads more slowly than many other virus diseases, they exclude several dangerous virus diseases such as sugar cane viruses, curly top of sugar beet, several potato viruses (leaf-rolls, mosaics, etc), tobacco viruses, streak or spotted wilt of tomato and aster yellows, which cause heavy losses under epidemic conditions.

Additional Crops Which Should be Included in the Survey

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3. [REDACTED] crops specified in the study as a complete list of ones which are most important in world production and world trade in agricultural products. The citrus fruits, especially oranges, grapefruit and lemon cannot be overlooked. There is as much economic reason for including barley and probably oats as there is for including the millets and sorghum. Abaca, and possibly sisal, should be included under fiber plants. The oil-palm (Elaeis guineensis) is of great importance for food and industry. The forage legumes, especially the clovers and alfalfa are of great world-wide importance. Sugar beets could well be included as also the tomato, which is one of the best world health crops.

Specific Crop and Disease Criticisms

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4. [REDACTED] assess bananas, cacao, coffee, coconut, rubber, grasses, beans, grapes, potatoes and tobacco.

(1) Banana

The period of maturity under usual conditions is from twelve to sixteen months. The proper name of the leaf spot fungus is Mycophthora blight (Burr) Sacc. & Magill. It is a synonym. The plantain Musa sapientum is not listed as a host.

The "Panama" or wilt disease of these spp, caused by Fusarium culmense, is probably the most serious and dreaded disease of this fruit. It has destroyed many thousands of acres of banana plantations. It occurs throughout the tropical world.

(2) Cacao

It is of interest to know that cacao is a native of Central and South America, and that this disease (Phytophthora Blight) was first detected in the Indian Peninsula in 1907 by E J Butler who named and described it. (Mem Dept Agr India Bot Ser 1:1--1907)

The following important papers are also omitted:

L H Leonian, "Heterothallism in Phytophthora." (Phytopath 21:941-955. 1931).

C M Tucker, "Taxonomy of the genus Phytophthora" (Mo Agr Expt Sta Res Bul 153--1931). The study contains a history of the disease and its related causal organisms.

C M Tucker, "Distribution of the genus Phytophthora." (Mo Agr Expt Sta Bul 164--1933). It is a much more complete account than is given in this paper. The statement, "even though some trees exhibit resistance, the extreme heterogeneity of Phytophthora palmivora does not offer much hope for selections of highly resistant clover," is contrary to experience with related organisms such as P infestans on potato.

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Witches Broom. The statement that "basidiospores are unimportant as a means of survival", is not warranted. The fungus requires the basidiospores for reinfection, and the fungus would probably disappear as a dominant organism without their production.

The statement that "all types of brooms can form sporophores" is erroneous and ambiguous. It is the fungus which forms the sporophores on the brooms.

Monilia Pod Rot. Ecuador should be cited as the original site of the disease from where it has spread to other countries.

Swollen Shoot. The accounts of etiology and epidemiology need to be brought up to date, e g, no mention is made of the nests of mealy bugs in the hollow *Canthium* trees where they are nursed and transported to the cacao by ants.

(J Nicol, Bul Entomological Res 42:31 1951)

(3) Coffee

The statement at the top of page 37 which would indicate that *C arabica* was grown only in the western hemisphere is quite contrary to the facts.

On page 41, paragraph 5, the statement that coffee culture was eliminated in Ceylon is no longer true. It is being grown there now (1954) (Mundkur).

Omphalia Leaf Spot. Colombia should be cited as the original home of the disease. Described by Delacroix in 1876. The most recent paper by Wellman is not included in bibliography. F L Wellman, "Dissemination of *Omphalia* Leaf Spot of Coffee". Turrialba 1:12-27-1952

(4) Cocoanut

A better understanding of the tree characteristics would include a phrase that the curved trunk is caused by the direction of prevailing winds.

Phytophthora Bud Rot. Two important papers by C M Tucker are omitted. The papers are "Phytophthora Bud Rot of Cocoanut in Puerto Rico". (Jour Agr Res 32:471-498-1926), this paper gives important facts regarding infection and control and "*Sabal causarium* Beccari, a new host of the Cocoanut Bud Rot Fungus" (Jour Agr Res 34:879-888--1927). It also includes another new host *Borassus flabellifer*. A third important paper should be listed, and also under Cacao. O A Reinking, "Comparative study of *Phytophthora faberi* on cocoanut and cacao in the Philippine Islands". (Jour Agr Res 25:267-284. Pl 1-12-1923).

(5) Rubber

The economic life of a rubber plantation is much longer than 25-30 years, as stated. The best estimates from Liberia is 70-75 years. Liberia should be included in the important rubber producing areas. The Firestone Plantation of approximately 100,000 acres is the largest single rubber plantation in the world. It was established in 1926.

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The statement at the top of page 79 that, "growing rubber under shade might be effective in lessening the seriousness of the disease", is a false assumption since the tree is naturally too tall for such a practice. Neither would it be economical to interplant from the standpoint of harvesting the latex.

Dothidella Leaf Blight. The statement in paragraph 3 on page 85 that "the fourth-day tapping method...was considered detrimental on...growth of trees" is very questionable, since the more frequent the tapping, the greater the drain on tree growth.

- (6) Cereals and Grasses. Echinochloa frumentaceum should be E. frumentacea. Pennisetum typhoideum should be P. glaucum. The Downy Mildew references to the paper by Melhus et al, should be Melhus, Van Haltern and Eliss. This reference appears several times in the account and in bibliography when referring to the 1928 paper.

There is no reference to seed transmission of the oospores Sclerospora graminicola which Melhus et al, state is the method by which this pathogen is distributed throughout the world. (Ref: W H Weston, Jour Agr Res 24:854-1923).

- (7) Maize.

The authors omitted cross reference to Sclerospora graminicola in the first para on page 104, which is important in the Far East.

Helminthosporium Blight. The authors fail to mention that the fungus is seed borne. (Ref: T F Mains and J F Adams, Jour Agr Res 23:495-524, 1923, and C H Kingsolver, and C T Yuan, Phytopath. 40:15--1950).

Rust. Some hosts of Puccinia polysora are omitted. (Ref: G B Cummins, "The Species of Puccinia parasitic on the Andropogoneae" Urediniana 4:40--1953, that is Euchlaena mexicana (teosinte)). The distribution of this rust is much wider than given by the authors of this paper. It would be of interest to know that this essentially tropical rust was first found and described in 1891 at Auburn, Alabama on Tripsacum dactyloides. It was first reported on maize from Peru in 1940.

Puccinia sorghi was first described from Bethlehem, Pennsylvania in 1832 by L D Schwenitz, Trans Am Phil Soc II 4:295,--1832.

Angiospora zeae Mains was first described from Guatemala where it was first found in 1936. The teliospore measurements are 12-18 x 16-38u. (Ref E B Mains, "Two unusual rusts of grasses." Mycologia. 30:42-45-1938.) A fourth rust of maize Angiospora pallescens (Arth) Mains was first discovered on Zea mays in Puerto Rico in 1916. It reached Trinidad in 1921, and was found in Colombia in 1926. It is present in Mexico, Central America and throughout the West Indies. The rust originally was described from Mexico on Tripsacum lanecolatum as Uredo pallida Diet and Holw in 1897. It was later named Puccinia pallescens Arth and transferred to the genus Angiospora by Mains. It is potentially dangerous to corn.

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- (8) Millet and Sorghum. Pennisetum typhoideum should be P glaucum (page 115).

Helminthosporium Blight. It is of interest to note that Helminthosporium sorghicola L & S mentioned on page 116 is assuming importance in Florida, Georgia and Louisiana. Sorghum anthracnose. Colletotrichum graminicolum should be C graminicola (page 116). The disease is of world wide distribution in contrast to authors' account which indicates it to be limited to the southern United States. (Ref R Sprague, "Diseases of Cereals and Grasses." Ronald Press. 538 pages 1950.)

Colletotrichum falcatum (red rot) is the imperfect stage of Physalospora tucumanensis, and is also of world wide distribution. Hosts are: Erianthus giganteus. Leptochloa spp, Saccharum officinarum, S spp, Sorghum spp (R Sprague, 1 c).

Zonate Leaf Spot of Sorghum. The disease spreads to maize in Louisiana, and is reported to be an important disease of bent grasses (Agrostis spp) on golf greens by Wernham and Kirby, 1943. (R Sprague, 1 c). Seed borne nature of the pathogen is not mentioned. (Ref: D C Bain, Phytopath, 40:521-522--1950). The account of Piricularia Leaf Spot of Millet is so completely out of date that it is misleading and worthless. It should be completely rewritten. (Sprague, 1 c). See comment under Rice.

Sooty Stripe Disease of Sorghum. My comments on the disease are the same as for Piricularia Leaf Spot. The proper name of the pathogen is Ramulispora Sorghi (Ell. & Ev). Olive and Lefebvre.

Rust Diseases of Millet and Sorghum. Puccinia purpurea is of world wide distribution. It was originally described on Sorghum vulgare from India in 1876 by Cooke. The account is very incomplete and confusing.

- (9) Rice.

Piricularia oryzae and P grisea are distinct pathogens according to their latest treatment by Sprague 1 c. P oryzae is restricted to rice, and is present in Arkansas, Louisiana, Texas, and Hawaii. Authors fail to mention the seed borne nature of the diseases. (Ref W H Tisdale, U S Dept Agr Bul 1116. 1922).

P grisea is distributed in Australia, Japan, British Guiana and U S A on many grasses, including the millets and sorghums, but not on rice.

Helminthosporium Blight. Account should be brought up to date. The disease has a much wider distribution than authors indicate. (Ref Y Nishikado, and C Miyake. Jour Plant Protection 2:693-712--1918, Also Sprague, 1 c)

Cercospora Leaf Spot. Considerable available information should be added. The pathogen is seed borne according to Tullis.

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Three important diseases of rice are omitted. Smut caused by Tilletia horrida Tak in the Far West; Tylenchus angustus Butl the "Ufra" disease in India caused by a nematode attacking the ovaries; Ustilago ginoidea virens (Oke) Tak, the false smut, world wide in distribution.

(10.) Sugar Cane. Red Rot. Several important references to Red Rot are omitted.

Smut. The account is badly garbled and two distinct smuts are confused. Sphacelotheca sacchari (Rab) Cifferi is the fungus cited in the paper as Ustilago sacchari, and occurs in China, India, Iran and Malaya on Erianthus ravennae and Saccharum spp. It was first described in 1871 from Iran. Ustilago scitaminea H & P Syd was first described on sugar cane from India in 1924. It is present in Argentina, Gold Coast, Union of South Africa, China, Burma, India, Java and the Philippine Islands. It is restricted to sugar canes. Two varieties of the pathogen are recognized. (a) U scitaminea Syd var Saccharibarbari Mund on Saccharum barbari. (b) U scitaminea variety Sacchariofficinatum Mund on Saccharum officinarum. (Ref: G L Zundel, "The Ustilaginales of the World". Penn State College Contr. 176, 410 pages--1953). Both diseases are probably seed borne.

Rusts. The account is confused and unreliable. The four rusts on Saccharum are as follows:

1. Puccinia kushnii Butl first described from Burma in 1914. It occurs on Saccharum spp and Sclerostachys fusca in Australia, Burma, Ceylon, China, Formosa, India, Japan, Philippine Islands and South Africa.
2. Puccinia micrantha Miura. First found on Micranthus saccharifolius in Manchuria in 1919, but attacks Saccharum narenga in China, Japan, Manchuria, Philippine Islands and U S S R. It is heteroecious with its aecial stage on Plantago in the Orient.
3. Puccinia erianthi Pad and Khan was first found at Simla, India in 1943 on Erianthus rufipilus and on sugar cane in Bombay State in 1949. At present, this rust is known only from China and India.
4. Tol reported in 1947 a rust on Saccharum spontaneum from Yunnan, China which is different from the three reported above. It has not been named. (Ref G B Cummins, "The species of Puccinia parasitic on the Andropogonae." Uredineana 4:10-11. 1953).

(11.) Wheat.

Rust. This account appears to rest on the "comprehensive treatise of Chester" (1946-1951), which I have not seen, but expect it to be an abstract report taken from many sources. It must be of limited distribution by [US research institute] and should be in the hands of readers of this account for complete information. Certainly, the paper should refer to "The Plant Rusts" by Arthur, Kern, Orton, Jackson, Mains and Bisby. John Wiley & Sons, 446 pages, 1929, which is the standard reference on this group of fungi. References should also be made to the numerous works of E C Stakman and associates, who are the world authorities on biologic races and forms of Puccinia graminis tritici. The authors' statement that P triticina (pate 140) is the most distinctive rust of wheat in the world is open to serious question. Few cereal pathologists would agree with this statement. There is a woeful lack

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- of information on losses from stem rust.
- (12.) Cotton. Rust. The account of the rusts of cotton is badly mixed. Puccinia stalmianii is not synonymous with Puccinia schedonnardi. They are distinct pathogens.
- (13.) Jute. Macrophomina Stem Rust. It is extremely doubtful if Macrophomina phaseoli (Maubl) Asmy is the pathogen causing stem rot of jute. The name applies to the dry rot of beans, and half of the references cited apply only to the bean pathogen. The jute pathogen was named Macrophoma cochori Saw.
- (14.) Beans. Powdery Mildew. The discussion of climatic factors influencing the disease is confusing and somewhat contradictory. The account would lead one to conclude that the disease is confined to the United States. It is very destructive to garden peas, and is world wide in distribution on many native and cultivated plants.
- Bacterial Blight. The statement on page 174 that the pathogen is systemic in bean plants is misleading. Systemic infection from seed may occur, but most of the spread in the field does not produce systemic infections.
- (15.) Flax. Rust. The rust may be seed borne when tella are on or with the seed.
- (16.) Grape. Downy Mildew. The pathogen is Plasmopara viticola, not Peronospora viticola. The disease is not systemic in the generally accepted use of this term. Occasionally, a terminal may be completely invaded by the pathogen, but not the entire plant. The disease is endemic in North America, and no doubt, has existed here as long as native species of Vitis have been known.
- Black Rot. The imperfect or conidial stage of the pathogen is Phyllosticta ampelopsidis, not a species of Phoma. In paragraph three, it is stated that "mature leaves are not affected." It would be correct to say the mature leaves are resistant to infection. The disease is generally present in the mature leaves as a result of early leaf infection, persisting during the maturing of the leaves. In the last paragraph on page 193, it is stated that "the fungus is not an important fruit pathogen." This is contrary to the experience generally, but it may be applied to the muscadine grape under certain conditions.
- (17.) Potato. Late Blight. Several very important references are omitted, especially the classic work of L R Jones, N J Giddings, and B F Lutman (U S D Agr Bur Pl Ind Bul 245:1-100. Pl I-X, 11g 1-10-1912).
- (18.) Tobacco. Downy Mildew. The authority for the name of the pathogen is Adams, not Adams. Penetration of the host may be direct, as well as by zoospores. The account of distribution is inadequate. It is probably present wherever tobacco is grown in temperate regions. It is known from the western hemisphere and Australia where the pathogen was named in 1933.

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In spelling P hyoscami, the writers omitted the letter "i".

Wild Fire. This epidemic disease caused by a bacterial pathogen. Pseudomonas tabaci (Wolf and Foster) Stev should be included

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Viruses. Some mention should be made of the several important virus diseases of tobacco.

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